

What is claimed is:

1. A manufacturing method for an optical data recording medium, comprising steps for:

5 preparing a substrate having a center hole and a data recording layer on one side;

coating the data recording layer with a resin material by a spin coating method in which the center hole of the substrate is plugged with a capping member and the resin material is dripped from substantially above the capping member while spinning the substrate centered on the center hole;

10 removing the capping member from the center hole;

preparing a stamper having on one side a groove or lands and pits;

pressing the groove or land-and-pit side of the stamper into the resin material on the substrate;

15 forming an intermediate layer from the resin material by curing the resin material; and

forming a data recording layer patterned according to the groove or lands and pits of the stamper in the surface of the intermediate layer on the above data recording layer by removing the stamper from the substrate.

2. A manufacturing method for an optical data recording medium, comprising steps for:

20

preparing a stamper having a center hole and a groove or lands and pits on one side;

25 coating the groove or lands and pits with a resin material by a spin coating method in which the center hole of the stamper is plugged with a capping member and the resin material is dripped from substantially above the capping

member while spinning the stamper centered on the center hole;

removing the capping member from the center hole;

preparing a substrate having a data recording layer on one side;

pressing the data recording layer side of the substrate against the resin

5 material on the stamper;

forming an intermediate layer from the resin material by curing the resin material; and

forming a data recording layer having a groove or lands and pits patterned according to the groove or lands and pits of the stamper in the surface of the intermediate layer on the data recording layer of the substrate by removing the  
10 substrate from the stamper.

3. A manufacturing method for an optical data recording medium according to claim 1, wherein the step for applying the resin material by a spin coating method comprises steps for:

15 applying a first resin material by a spin coating method by dripping the first resin material from substantially above the center hole while spinning the target about the center hole;

forming a first intermediate layer from the first resin material by curing the first resin material; and

20 applying a second resin material on top of the first intermediate layer by a spin coating method by dripping the second resin material from substantially above the center hole while spinning the target about the center hole.

4. A manufacturing method for an optical data recording medium, comprising steps for:

25 preparing a substrate having a data recording layer on one side;

coating the data recording layer with a first resin material by a spin coating method;

curing the first resin material;

preparing a stamper having a groove or lands and pits on one side;

5                   applying a second resin material over the groove or lands and pits by a spin coating method;

pressing the cured first resin material on the substrate against the second resin material on the stamper;

10                   forming an intermediate layer composed of the first resin material and second resin material by curing the second resin material; and

forming a data recording layer with a groove or lands and pits corresponding to the groove or lands and pits of the stamper in the surface of the intermediate layer on the data recording layer of the substrate by removing the substrate from the stamper.

15    5.            A manufacturing method for an optical data recording medium, comprising steps for:

preparing a substrate having a data recording layer on one side;

coating the data recording layer with a first resin material by a spin coating method;

20                   preparing a stamper having a groove or lands and pits on one side;

applying a second resin material over the groove or lands and pits by a spin coating method;

curing the first resin material;

25                   pressing the second resin material on the stamper against the first resin material on the substrate;

forming an intermediate layer with two sublayers formed by the first resin material and second resin material by curing the second resin material; and

forming a groove or lands and pits corresponding to the groove or lands and pits of the stamper in the surface of the intermediate layer by removing the stamper from the substrate.

6. A manufacturing method for an optical data recording medium according to claim 4, wherein the step for applying the resin material by a spin coating method comprises steps for:

plugging the center hole of the substrate or stamper with a capping member; and

applying the resin material by a spin coating method by dripping the resin material from substantially above the center hole.

7. A manufacturing method for an optical data recording medium according to claim 1, wherein the steps for pressing the substrate and stamper together are performed in a vacuum environment.

8. A manufacturing method for an optical data recording medium according to claim 1, wherein the resin material is a radiation curable resin.

9. A manufacturing method for an optical data recording medium according to claim 1, wherein the substrate and stamper are made from different materials.

10. A manufacturing method for an optical data recording medium according to claim 1, further comprising, after the step for preparing a stamper, a step for treating the surface of the stamper that is pressed to the resin material to improve separation of the stamper from the resin material.

11. A manufacturing method for an optical data recording medium

according to claim 1, further comprising, after the step for preparing a substrate, a step for treating the surface of the substrate opposing the resin material to improve adhesion with the resin material.

12. A manufacturing method for an optical data recording medium according to claim 1, wherein the thickness of the intermediate layer is within the range of 5 to 35  $\mu\text{m}$ .

13. A manufacturing method for an optical data recording medium according to claim 12, wherein the thickness of the intermediate layer is within the range of 20 to 30  $\mu\text{m}$ .

14. A manufacturing method for an optical data recording medium according to claim 1, further comprising steps for:

forming a recording film or reflective film on the groove or lands and pits formed in the intermediate layer; and

forming a transparent layer over the groove or lands and pits.

15. A manufacturing method for an optical data recording medium according to claim 14, wherein the transparent layer is made from a radiation curable resin.

16. A manufacturing method for an optical data recording medium according to claim 1, wherein the center hole of the substrate and the center hole of the stamper are substantially the same size.

17. A manufacturing method for an optical data recording medium according to claim 1, wherein the step for applying the resin material by spin coating drives the target for three seconds or longer at a rotational velocity of 100 to 10,000 rpm.

18. A manufacturing method for an optical data recording medium

according to claim 17, wherein the step for applying the resin material by spin coating drives the target for three seconds or longer at a rotational velocity of 100 to 5,000 rpm.

19. A manufacturing method for an optical data recording medium according to claim 1, wherein the step for applying the resin material by spin coating and the step for forming a recording film or reflective film over the groove or lands and pits are repeated multiple times to form three or more data recording layers.

20. An optical data recording medium having two recording layers, a first recording layer and a second recording layer, comprising:

- 10 a round substrate;
- a first recording layer having a groove or lands and pits on one side of the substrate;
- a first intermediate layer formed so as to fill the groove or lands and pits in the first recording layer;
- 15 a second intermediate layer formed on the first intermediate layer;
- a second recording layer having a groove or lands and pits formed on the opposite side of the second intermediate layer from the first intermediate layer;
- and
- a transparent layer formed so as to fill the groove or lands and pits in
- 20 the second recording layer;
- characterized by the interfacial surface between the first intermediate layer and the second intermediate layer having a slope in the radial direction from the inside circumference side to the outside circumference side of the substrate.
- 21. An optical data recording medium according to claim 20, wherein the
- 25 first and second recording layers each have a reflective film formed over the groove

or lands and pits.

22. A manufacturing method for an optical data recording medium, comprising steps for:

preparing a first substrate;

5 coating the first substrate with a radiation curable resin;

curing the radiation curable resin in part;

preparing a second substrate having a groove or lands and pits on one side;

10 disposing a resin material to the side of the second substrate having the groove or lands and pits; and

pressing the radiation curable resin of the first substrate and the resin material of the second substrate together.

23. A manufacturing method for an optical data recording medium according to claim 22, wherein the step for curing in part the radiation curable resin  
15 coating the first substrate is characterized by changing the cured state of the radiation curable resin inside and outside a specified radius of the first substrate.

24. A manufacturing method for an optical data recording medium according to claim 23, wherein the specified radius is 90% or more of the radius of the first substrate.

20 25. A manufacturing method for an optical data recording medium according to claim 22, wherein an adhesive material is used for the resin material.

26. A manufacturing method for an optical data recording medium according to claim 22, wherein a second radiation curable resin is used for the resin material.

25 27. A manufacturing method for an optical data recording medium

according to claim 26, wherein the same radiation curable resin coated to the first substrate is used as the second radiation curable resin.

28. A manufacturing method for an optical data recording medium according to claim 26, further comprising a step for curing in part the second radiation curable resin coating the second substrate.

29. A manufacturing method for an optical data recording medium according to claim 28, wherein the step for curing in part the second radiation curable resin coating the second substrate is characterized by changing the cured state of the second radiation curable resin inside and outside a specified radius of the second substrate.

30. A manufacturing method for an optical data recording medium according to claim 29, wherein the specified radius is 90% or more of the radius of the second substrate.

31. A manufacturing method for an optical data recording medium according to claim 22, further comprising, after the step for pressing the first and second substrates together, a step for curing the radiation curable resin by exposure to radiation.

32. A manufacturing method for an optical data recording medium according to claim 22, wherein at least one of the first and second substrates is substantially transparent to radiation for curing the radiation curable resin.

33. A manufacturing method for an optical data recording medium according to claim 22, wherein a groove or lands and pits are on the surface of the first substrate coated with the radiation curable resin.

34. A manufacturing method for an optical data recording medium according to claim 22, wherein a groove or lands and pits are on the surface of the



second substrate to which the resin material is disposed.

35. A manufacturing method for an optical data recording medium according to claim 22, wherein the first substrate has one or more recording layers.

36. A manufacturing method for an optical data recording medium  
5 according to claim 22, wherein the second substrate has one or more recording layers.

37. A manufacturing method for an optical data recording medium according to claim 33, further comprising a step for removing the first substrate or second substrate and forming a groove or lands and pits corresponding to the  
10 groove or lands and pits in the first substrate or second substrate.

38. A manufacturing method for an optical data recording medium according to claim 37, further comprising, after the step for removing the first substrate or second substrate, a step for forming a data recording layer by forming a reflective film over the groove or lands and pits.

15 39. A manufacturing method for an optical data recording medium according to claim 38, further comprising a step for forming a transparent layer on the data recording layer.

40. A manufacturing method for an optical data recording medium according to claim 22, characterized by exposing to radiation part of the radiation  
20 curable resin disposed to the first substrate to cure the resin in part.

41. A manufacturing method for an optical data recording medium according to claim 28, characterized by exposing to radiation part of the second radiation curable resin disposed to the second substrate to cure the resin in part.

42. A manufacturing method for an optical data recording medium  
25 according to claim 22, further comprising, after the step for curing the radiation

curable resin in part, a step for removing all or part of the uncured part of the radiation curable resin.

43. A manufacturing method for an optical data recording medium according to claim 22, characterized by the step for coating the radiation curable resin to the first substrate applying the radiation curable resin by a spin coating method.

44. A manufacturing method for an optical data recording medium according to claim 43, characterized by the step for coating the first substrate with the radiation curable resin comprising steps for:

10 closing the center hole of the first substrate with a capping member;  
and

coating the radiation curable resin to the first substrate by dripping the resin from substantially above the center hole while spinning the first substrate centered on the center hole.

15 45. A manufacturing method for an optical data recording medium according to claim 26, characterized by the step for coating the second radiation curable resin to the second substrate applying the second radiation curable resin by a spin coating method.

46. A manufacturing method for an optical data recording medium according to claim 45, characterized by the step for coating the second substrate with the second radiation curable resin comprising steps for:

closing the center hole of the second substrate with a capping member;  
and

25 coating the radiation curable resin to the second substrate by dripping  
the resin from substantially above the center hole while spinning the second

substrate centered on the center hole.